MEAT PURCHASES AND PREFERENCES IN HAWAII

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AGRICULTURAL ECONOMICS BULLETIN 8

UNIVERSITY OF HAWAII, COLLEGE OF AGRICULTURE
HAWAII AGRICULTURAL EXPERIMENT STATION

in cooperation with the
AGRICULTURAL EXPERIMENT STATIONS
OF THE WESTERN STATES AND THE
AGRICULTURAL MARKETING SERVICE
UNITED STATES DEPARTMENT OF AGRICULTURE

JUNE 1954

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ABSTRACT

In recent years Hawaii has been producing about half of the meats, including poultry and fish, that are consumed in the Islands. A considerable part of the meat imported by Hawaii originates in the western states. The Island of Oahu, on which Honolulu is located, is the principal consuming area of the Territory and at least three quarters of the Territory's meat disappearance is accounted for by this one market area. Honolulu has a relatively large transient population consisting mostly of tourists and military personnel. This indeterminate and highly variable segment of the market induces a more or less important element or error when per capita rates of consumption are being measured.

On the basis of the apparent net supply of red meats, Hawaii's 465,325 residents in 1952 consumed about 125 pounds per capita of meats other than poultry and fish. Over 45 percent of these meats were beef and veal, and pork in its various forms made up one third of the total. Some two thirds of the beef and veal originated in the Islands, but only 40 percent of the pork came from local farms. The lack of facilities for processing pork produced in Hawaii is one serious limiting factor affecting the marketing of that commodity. From 1948 to 1952 the per capita consumption of beef, veal, and lamb changed very little in the Territory, but the use of fresh and frozen pork gained about 50 percent. In 1952, the per capita disappearance rate of almost 125 pounds for red meats gave Hawaii a comparative ratio of 87 percent on the basis of the mainland rate. Among the red meats, it is in the use of pork that Hawaii most definitely lags behind the Mainland. The Islands have a relatively low consumption rate on poultry also, but the use of fish by local residents is almost treble the mainland per capita consumption.

On the basis of a survey covering 1,066 households in the Honolulu area, the annual consumption of red meats, poultry, and fish *in the home* totaled almost 157 pounds per capita in 1952. Beef and veal in the fresh or frozen form made up 30 percent of the home consumption; and pork, including ham and bacon, was second in importance with 25 percent of the total. Lamb and mutton were among the minor items in the diet of Honolulu families, being less than 2 percent of all red meats. Poultry accounted for another 13 percent, and fish of various kinds were equivalent to 17 percent of all meats. The apparent restaurant and institutional use of meats on Oahu in 1952 made up another 35.7 pounds which, when added to the household consumption, results in an over-all rate of more than 192 pounds of meat per capita for the Island of Oahu in 1952. This rate is slightly above the comparable figure reported for the entire United States in 1952.

Meat purchases decline on a per capita basis as the size of the family increases. For example, the rate for families of three was 3.32 pounds of meat per person per week, while for families of six the rate was only 2.59 pounds. It is estimated that 41 percent of the households of all sizes in the Honolulu market area are using from 8¼ to 16 pounds of meat per week. Family size also affects price paid for meat. Families of 4 or less persons paid an average of 81.3 cents per pound while families of 5 or more paid 75.4 cents per pound.

Income is a major factor influencing meat purchases. Consumption of all meats increases as family income rises, but income causes a substantial difference in consumption of individual kinds and types of meat. Beef and ham, for example, show a relatively high rate of increase as family income advances. It was also found that the use of spareribs and Hawaiian fish actually declines as income moves upward. Survey findings tend to show that meat consumption is affected more by income changes in the lower brackets than it is by shifts occurring above the mid-point.

Prices paid for meats averaged 77.1 cents per pound where family incomes were under $400 per month, and 79.2 cents per pound was the average where the income was greater than $400 per month.

Racial background of families appears to affect directly the quantities and kinds of meat consumed by Honolulu families. Religious preference also has a limited effect on the use of meat, but this factor is much less important than race as a determinant of consumption in the over-all market. Hawaiians and Caucasians, who used 3.22 and 3.19 pounds of meat per capita per week, respectively, were the heaviest consumers of meats. The Chinese reported a somewhat lower average of 3.04 pounds, and the Japanese with a per capita rate of only 2.35 pounds per week were at the foot of the scale. Race also influences the selection of particular meats by the different ethnic groups. This is illustrated by the findings that the Chinese use relatively more pork, the Hawaiians eat larger quantities of fish, and both the Japanese and Chinese are more inclined toward use of poultry.

A majority of the families surveyed said that they preferred island meats to those imported from the Mainland. The degree of preference for island meat varied considerably, however, since it ranged from over 4 to 1 on beef to only about 2.5 to 1 on pork. The major reason for this preference stems from the freshness of local meats and the allegation that they are also tastier. Local poultry was preferred to the mainland product by a margin of 3 to 1, and again the preference was based mostly on degree of freshness. Most families (over 75 percent) prefer to buy poultry either dressed and drawn or cut up and packaged. Some differences were noted in the poultry preferences of racial groups, e.g., the Caucasians had a strong preference for the cut up and packaged product, while the majority of the Japanese preferred their poultry only dressed and drawn. Poultry was purchased in lieu of other meats mostly because it adds variety to the diet or because of family eating habits.

Public eating places are one of the major outlets for both island and mainland meats marketed in the Honolulu area. The presence of numerous transients, such as tourists and military personnel in Hawaii, tends to distort per capita consumption averages by adding considerably to the clientele of the local restaurants. Restaurants absorbed an estimated 20 to 30 percent of the net supply of meats reaching the Honolulu market in 1952. Among the different kinds of meat used by restaurants, survey results show that beef makes up almost 41 percent of the volume purchased, and pork totals about 19 percent. Poultry, with 15 percent, is the third ranking group of meats in the eating places. The other major classification is made up of fish, which approaches poultry in volume, with the equivalent of 12 percent of all meats.

In general, the restaurants surveyed expressed a strong preference for mainland meats. The degree of preference, measured by total number of establishments designating mainland meats as their choice, varied considerably, however, and ranged from slightly over 50 percent on beef to 75 percent on pork. Poultry from the Mainland was preferred by 60 percent of the eating places. The imported meats find greater favor among restaurant operators for several reasons. It is said that the mainland product is more uniform in quality and appearance, that there is less fat on the pork, that the supply is more regular, that the specific types and cuts of meat needed are more readily available, and that in some cases the price is lower than that of the comparable local meat. Among those restaurants preferring the island meats, the reason most frequently advanced for this preference was the same as that stated by families: they preferred the local product because it is fresh and considered tastier. Where it exists, this preference for island meats may also be the result of catering to a clientele made up mostly of local residents.

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MEAT PURCHASES AND PREFERENCES IN HAWAII

INTRODUCTION

Although 1952 statistics indicate that some 1,000 farm units in the Territory of Hawaii were engaged in the commercial production of livestock for conversion into meat, there still was imported into the Territory a quantity of these same meats that was equivalent to almost half of the total local market supply. Most of these imports originate in the western states, and the Hawaiian Islands are thus providing an outlet for some of the meats produced in the western region of the Mainland. Poultry meat utilized in Hawaii is predominately of mainland origin, but fish are for the most part taken from local waters. Because of its geographic position and production characteristics, Hawaii does not now export meats, nor is it likely that the Islands will soon develop supplies of local meat that will cause effective closure of the local market as an outlet for at least limited quantities of mainland meats. In these circumstances, the major features of the Hawaiian demand for meats are of interest to both local producers and the livestock interests of the western states.

PURPOSE OF THE STUDY

The study on which this report is based was initiated as one phase of a regional livestock marketing project that has been in progress for several years. Eleven western states, Texas, and Hawaii have been participating in this over-all project. In this particular assignment, the Hawaii Agricultural Experiment Station has investigated the demand for and consumption of meats, including poultry and fish, in Hawaii with particular emphasis on the Honolulu market area. This type of investigation is facilitated by the geographically isolated position of Hawaii, which tends to lessen the usual problem of measuring the total market supply or disappearance of meats in a given market area on the Mainland.

Hawaii's phase of the regional project was set up and conducted with three major objectives in mind:

1. To measure the total and per capita supply or disappearance of meats in the market.
2. To obtain detailed information on meat purchases and preferences of Honolulu consumers.
3. To consider the adequacy of a consumer survey as a measure of meat consumption in a market area.

Results of this study, are expected to be of particular interest to the livestock producers of Hawaii and to those meat distributors who are active in supplying the Honolulu area. On the basis of the indicated consumption pattern in this market it should be possible to plan production and sales programs that are more clearly in line with requirements and preferences of the local consumers. Since this particular phase of the Western Regional Project on livestock marketing is somewhat of a pilot study, the procedure and outcome may serve as a guide in developing and conducting similar investigations in other markets.

METHODOLOGY

In the course of this study, personnel assigned to the project worked closely with the Crop and Market Reporting Section of the University of Hawaii Agricultural Extension Service in assembling reports on the disappearance of meats in the Honolulu market area and in the entire Territory of Hawaii. Supply data collected for 1952 under this project included a record of imports of all kinds of meats, tabulation of

outshipments from the Territory of Hawaii or to islands other than Oahu within the Territory, and recording of sales by civilian importers to the military agencies. Inventories of meat in storage at the beginning and end of the 1952 calendar year were also obtained. To complete the supply data for the calendar year, it was necessary to secure slaughter records on locally produced livestock.

During October 1952, a survey of meat purchases and preferences was conducted among 1,066 families located in the Honolulu market area. Selection of these families was based upon a multistage sample in which census tracts and enumeration districts served as the basic units from which the households were taken at random. The questionnaire used in this survey was designed to indicate not only the kinds and quantities of meat purchased by each family in a 7-day period but also the family characteristics that would be expected to affect the demand for meats. Among the latter factors were income, size of family, racial background, and religion. Preferences for meat, by kinds and origin (Mainland versus Island), were also obtained in the interviews with respondent families. Reasons for indicated preferences were included in the survey.

A survey of meat purchases by Honolulu eating places during October 1952 was also carried on as a supplement to the canvassing of individual families. Restaurant operators were also asked to indicate their preference for certain kinds of meats and the reasons for such preference. Forty-five completed questionnaires were obtained from the restaurant operators.

To provide a more detailed explanation of the methodology used in this study, there has been added to the report an appendix which serves primarily as a statistical supplement. Those readers who are interested in the statistical technique employed in this work, as well as in details of the analysis, are urged to examine the contents of the Appendix.

MEAT CONSUMPTION IN HAWAII

THE MARKET

From 1948 to 1952, the population of Hawaii averaged 476,412, and in 1952 it was estimated that there were 465,325 people residing in the Territory (table 1). From the standpoint of racial antecedents, the 1950 Census indicated that 37 percent of Hawaii's population was of Japanese ancestry, 17 percent Hawaiian or part-Hawaiian, 23 percent Caucasian, 12 percent Filipino, and 6 percent Chinese. The balance of some 5 percent was composed of several groups, such as Puerto Ricans, Koreans, etc. About half of the total population is located in the city of Honolulu. When the area of coverage is expanded to include the entire Island of Oahu, the Honolulu market then embraces two thirds of the Territory's people. Honolulu is the point at which the great bulk of the livestock produced in the Islands is slaughtered, and most of the meat shipped to Hawaii by mainland firms is consigned to

Table 1.—Territory of Hawaii population estimates from July 1, 1948, to July 1, 1952.*

YEAR	TERRITORY	HONOLULU MARKET AREA	
		City	Oahu
1948	491,146	251,812	346,443
1949	481,537	242,438	334,879
1950	471,447	234,320	323,517
1951	472,602	237,651	328,426
1952	465,325	232,553	325,797
5-year average	476,412	239,755	331,812

* Board of Health, Territory of Hawaii.

this port. It thus becomes readily apparent that Oahu is the major island market for meats, both local and Mainland. For this reason, the major emphasis of this report is placed on the meat consumption pattern in the Honolulu market area. Existence of a relatively large but generally indeterminate number of tourists and military personnel in the Islands creates a serious problem in measuring per capita consumption of meats on the basis of the over-all market supply. This difficulty is particularly apparent in the Honolulu market.

NET SUPPLY AND PER CAPITA DISAPPEARANCE

In 1952 the apparent net supply of red meats (poultry and fish excluded) absorbed by consumers in the entire Territory totaled 58,012,000 pounds. This was equivalent to 124.7 pounds of these particular meats for each of Hawaii's 465,325 residents. Some distortion is inevitably present in this per capita average because it is not possible to determine or adjust with any certainty of accuracy the quantity of meat consumed by tourists and other transients. In calculating the net supply, adjustments were made for family slaughter of pork and for inventory differences at the beginning and close of the year. Allowance was also made for sales to military supply agencies and for outshipments from the Territory. As table 2 indicates, the net supply includes fresh, frozen, and processed meats, whether produced in Hawaii or imported from outside the Territory.

Beef and veal totaling 27,351,000 pounds made up over 45 percent of the net supply of red meats consumed by residents of Hawaii in 1952; while pork, with 19,644,000 pounds, accounted for about one third of the total. Most of the balance consisted of the miscellaneous processed meats, such as frankfurters, sausages, and luncheon meats. All except 5 percent of the beef and veal was marketed in the fresh or frozen form. Pork in the cured or canned form, mostly bacon and ham, made up 29 percent of all pork consumed. On the basis of origin, the Territory of Hawaii itself supplied 48 percent of all the red meats consumed in the Islands during 1952. Less than 1 percent of the balance came directly from foreign countries such as Canada, Australia, and New Zealand. Thus, about half of these meats originated on the Mainland. Approximately two thirds of the beef and veal was produced locally, while slightly over 40 percent of the pork came from island farms. Substantially all of the commodities classified as "miscellaneous processed meats" were

Table 2.—Net market supply and per capita disappearance of certain meats, by kind and form, Territory of Hawaii, 1952.

ITEM	FRESH AND FROZEN		CURED AND CANNED		NET MARKET SUPPLY*	ANNUAL DISAPPEARANCE PER CAPITA†
	1,000 lbs.	*Percent*	*1,000 lbs.*	*Percent*	*1,000 lbs.*	*Pounds*
Beef and veal	25,958	95	1,393	5	27,351	58.8
Pork	13,981	71	5,663	29	19,644	42.2
Lamb and mutton	929	100	—	—	929	2.0
Miscellaneous processed meats	—	—	8,692	100	8,692	18.7
Offal	1,396	100	—	—	1,396	3.0
Total	42,264	73	15,748	27	58,012	124.7

* Consists of imports from mainland and foreign ports and of island slaughter, adjusted for inventory changes, farm slaughter, outshipments, and direct sales to military agencies.
† Population estimated at 465,325 as of July 1, 1952, Board of Health, Territory of Hawaii.

Note: Market supply is based on wholesale weight, with fresh and frozen meats in the dressed form.

Table 3.—Net production and imports of certain meats (in thousands of pounds), by kind and form, Territory of Hawaii, 1952.

ITEM	FRESH AND FROZEN			PROCESSED	NET MARKET SUPPLY*	PRODUCTION RATIO†
	Production	Imports	Total	Imports		
Beef and veal	18,424	7,534	25,958	1,393	27,351	67.4
Pork	7,953	6,028	13,981	5,663	19,644	40.5
Lamb and mutton	120	809	929	—	929	12.9
Miscellaneous processed meats	—	—	—	8,692	8,692	—
Offal	1,113	283	1,396	—	1,396	79.7
Total	27,610	14,654	42,264	15,748	58,012	47.6

* Consists of imports from mainland and foreign ports and of island slaughter, adjusted for inventory changes, farm slaughter, outshipments, and direct sales to military agencies.
† Relationship of island production to net market supply.

Note: Market supply is based on wholesale weight with fresh and frozen meats in the dressed form.

imported. The small volume of island meats processed locally is included among the items making up the fresh and frozen classification in table 3. If only fresh and frozen meats are considered, then the relationship of Hawaii's production to the total supply is improved considerably. On that basis, local production accounts for two thirds of the total. This result is not unexpected in view of the very limited facilities now available for processing local meats. Among the Hawaiian Islands, the Island of Hawaii is the principal producer of beef, while Oahu accounts for most of the local pork. All of the major neighbor islands have some surplus of beef that they ship to Oahu, but all islands in the chain except Oahu are deficit areas as far as pork is concerned.

On the basis of 1952 importations, it is evident that Hawaii's major meat deficit is pork, because almost 12 million pounds, half of it fresh or frozen, was imported. Despite the fact that the Territory produced two thirds of its beef, still over 7.5 million pounds of this commodity were brought in from outside the Islands. These figures do not take into account the substantial quantities of meats imported by the Armed Services.

TREND OF PER CAPITA DISAPPEARANCE

Data relating to disappearance of the principal meats, other than poultry and fish, in the Territory of Hawaii during years prior to 1952 are not available on the same adjusted basis as those established for 1952 in the course of this study. For trend purposes, however, the regular series based only on gross receipts from mainland and foreign ports and from Territorial slaughter is a rough indicator of the magnitude of meat consumption and the direction in which it is moving. Table 4 shows the per capita disappearnace of fresh and frozen beef and veal, pork, and lamb and mutton in the entire Territory during the period of 1948 through 1952. For the purposes of this particular table, the 1952 supply figures are not adjusted for inventory changes, farm slaughter, and sales to military agencies; and processed meats are not included. On the basis of this 5-year series, it appears that the people of Hawaii have registered only a relatively small increase in the use of beef, veal, lamb, and mutton since 1948. Apparent consumption of fresh and frozen pork, however, has increased consistently from a low of 19.1 pounds per person in 1948 to 28.9

pounds per capita in 1952. Any conclusion based on these indicators of annual per capita disappearance must be tempered by consideration of the increase in tourists and military personnel that has occurred in Hawaii since 1948. Despite the upward bias in per capita consumption resulting from this unmeasurable factor, the true per capita consumption rates of the permanent population would undoubtedly be in line with the trends indicated by table 4.

Among the three major classifications of red meats, Hawaiian consumers showed a strong preference for beef (including veal), which had an average disappearance rate of almost 51 pounds per person during the 1948–52 period. Use of pork in the fresh or frozen form during the same years averaged 24 pounds per capita, which was less than half the rate for beef. Lamb and mutton made up only a very minor part of the total meat supply and accounted for only 1.6 pounds of the annual disappearance per person from 1948 to 1952.

Reverting to the adjusted per capita disappearance rate for 1952 (tables 2 and 6), the total of 124.7 pounds (poultry and fish excluded) for the year is about 86.5 percent of the national rate. The national rate was reported as 144.1 pounds.[1] As far as regional comparisons are concerned, Hawaii's disappearance rate for red meats appears to be below that of all mainland areas except the South. This conclusion is based upon a report of 1950 disappearance rates in the United States.[2] Among the several kinds of meat, it is in the use of pork that Hawaii shows the greatest disparity when the local disappearance rate is compared to mainland consumption. For the period of 1948–52 the per capita consumption of all types of pork in the Islands has averaged about half the mainland rate, although the ratio advanced to two thirds in 1952. The average disappearance rate of beef, however, has been about the same in Hawaii as on the Mainland from 1948 through 1952. Per capita consumption of poultry in Hawaii was considerably below the mainland rate in 1952, but the use of fish by island residents was almost three times the rate

Table 4.—Market receipts and per capita disappearance (in pounds) of certain fresh and frozen meats, Territory of Hawaii, 1948–52.*

YEAR	BEEF AND VEAL		PORK		LAMB AND MUTTON		TOTAL	
	Market receipts	Per capita	Market receipts	Per capita	Market receipts	Per capita	Market receipts	Per capita
1948	23,531,000	47.9	9,389,000	19.1	581,000	1.2	33,501,000	68.2
1949	25,327,000	52.6	10,118,000	21.0	723,000	1.5	36,168,000	75.1
1950	23,267,000	49.1	12,459,000	26.4	767,000	1.6	36,493,000	77.4
1951	22,935,000	48.5	12,477,000	26.4	717,000	1.5	36,129,000	76.4
1952	25,669,000	55.2	13,470,000	28.9	926,000	2.0	40,065,000	86.1
Average	24,146,000	50.7	11,583,000	24.4	743,000	1.6	36,471,000	76.6

* Not adjusted for inventory changes, farm slaughter, or sales to military agencies. Processed meats, including ham and bacon, are not included.

Source of data: University of Hawaii Agricultural Extension Service.
Note: Receipts and disappearance represent dressed, wholesale weight.

[1] *National Food Situation*, July-Sept. 1953, table 1. U. S. Dept. Agr., Bur. Agr. Econ., July 1953.
[2] J. C. Purcell and V. John Brensike. *Net Marketing and Slaughter of Livestock and Consumption of Meat by Regions, 1950.* Preliminary Report 1953.

on the Mainland. It is this relatively high consumption rate for fish that brings Hawaii's over-all, per capita use of meats up to a point that is equal to the mainland rate.

MEAT PURCHASES OF HONOLULU CONSUMERS

The meat-buying practices of consumers in Honolulu and vicinity were the subject of a survey conducted during October 1952.[3] This particular month was selected because it represented a period during the school term that was free of most holiday influences. A total of 1,066 families, made up of 4,759 individuals, responded to the personal calls of the interviewers. Of this number, 999 families were located in Honolulu proper, while the remaining 67 families resided in outlying districts of the Island of Oahu. The survey was centered in Honolulu, because this one city contains about one half of Hawaii's population and is thus the major concentrated-consuming area in the Islands. Through this survey, information was obtained not only on what meats were purchased by each family during a 7-day period but also on why the particular meats were selected. Data concerning size of family, income, racial background, religious preference, occupation, and education completed the pattern of basic information considered essential in analyzing the meat-buying habits of Honolulu consumers.

QUANTITIES OF MEAT PURCHASED

Meat consumption of the 1,066 households during the 7-day survey period in October 1952 totaled 14,595 pounds or an average of 13.69 pounds per family unit. The distribution of these purchases is indicated in table 5. Fresh or frozen beef and veal, with 4,400 pounds, accounted for 30 percent of the entire volume included in the survey sample. Steaks alone made up almost half of the meat purchases in this particular classification.[4] Purchases of fresh, frozen, and processed pork, totaling 3,716 pounds, were equivalent to 25 percent of all meat obtained by the families during the survey period. In contrast to the beef situation, pork purchases were not so highly concentrated in any one form, since bacon, loins and steaks, roasts, and ham each made up from 19 to 25 percent of the total volume in this catergory.Lamb and mutton made up only an insignificant part of the meat purchases, but miscellaneous processed meats were one of the major groups because they more than equaled the volume of bacon and ham reported in the survey. Poultry, consisting mostly of chickens, was a relatively important classification, with 1,876 pounds of about 13 percent of the total. Fish is an important item in the diet of Hawaiian consumers. The 2,260 pounds of fish reported in the survey sample were equivalent to 15 percent of all meats. At this level, fish made up a volume equal to over half that of beef and veal or a volume of almost two thirds of the pork reported by respondents. Shellfish accounted for another 2 percent of the total meat consumption by households included in the survey.

By expanding the per capita purchases of all meats (including poultry, rabbit, and fish), during the 7-day survey period it is possible to establish a calculated estimate of the annual consumption rate for each of the commodities. In table 6, this method has been employed to obtain the indicated per capita home consumption rate for the City and County of Honolulu. On the basis of the Honolulu home survey, the annual per capita consumption of all meats by households only is approximately 157 pounds.

[3] See Appendix for explanation of survey procedure and method of analysis.

[4] To an undetermined extent the indicated consumption of steaks may be subject to an upward bias resulting from expression of preference rather than actual consumption by respondents in the home survey. Importation of frozen steaks from the Mainland accounts in large part for the high proportion of steaks in relation to other items of beef.

Table 5.—Weekly consumption of all meats by 1,066 households on the Island of Oahu, Hawaii, October 1952.

ITEM	QUANTITY IN SURVEY SAMPLE	GROUP TOTAL	ITEM TO GROUP TOTAL	GROUP TO ALL MEATS
	Pounds	*Pounds*	*Percent*	*Percent*
BEEF AND VEAL				
Beef:				
Steaks	2,060		47	
Roasts and stews	1,240		28	
Ground	750		17	
Offal	161		4	
Other beef	88		2	
Total beef	4,299			
Veal:				
Chops and cutlets	79		2	
Other veal	22		*	
Total veal	101			
Total beef and veal		4,400	100	30
PORK				
Fresh and frozen:				
Loins and steaks	758		20	
Roasts	852		23	
Spareribs	332		9	
Other	102		3	
Total fresh and frozen	2,044			
Ham	950		25	
Bacon	700		19	
Other pork	22		1	
Total pork		3,716	100	25
LAMB AND MUTTON				
Loins	139		58	
Other	100		42	
Total lamb and mutton		239	100	2
PROCESSED MEATS, MISCELLANEOUS				
Frankfurters and sausages	738		44	
Canned meats	935		56	
Total processed meats		1,673	100	12
POULTRY				
Chickens	1,695		90	
Turkeys	115		6	
Other	66		4	
Total poultry		1,876	100	13

Table 5.—Cont.

ITEM	QUANTITY IN SURVEY SAMPLE	GROUP TOTAL	ITEM TO GROUP TOTAL	GROUP TO ALL MEATS
RABBIT		72		1
FISH				
Fresh, frozen, cured:				
Hawaiian	1,719		76	
Mainland	138		6	
Other fish	60		3	
Total fresh, frozen, cured	1,917			
Canned fish	343		15	
Total fish		2,260	100	15
SHELLFISH				
Fresh and frozen	324†		90	
Canned	35		10	
Total shellfish		359	100	2
TOTAL ALL MEATS		14,595		100

* Less than 1 percent.
† Gross weight before cleaning.

Note: Quantities of meat reported by survey respondents represent retail weights.

To obtain a total consumption rate it is necessary to consider the meats used by the institutional trade, particularly restaurants. One method of computing this increment, which must be added to home use, is to consider it equivalent to the difference between the calculated home consumption and the disappearance based on the net market supply of meats. On this basis (see table 6) it appears that meats consumed by institutions and restaurants are equivalent to almost 23 percent of the home use. When the 35.7 pounds apparently used by the institutional trade are added to the 156.7 pounds of home consumption, the gross per capita consumption rate for the Honolulu market is 192.4 pounds of red meats, poultry, rabbit, and fish. The comparable national average for this group, except rabbit and poultry other than chicken and turkey, in 1952 was reported to be 189.6 pounds.[5] In a subsequent section of this report, further attention is given to the use of meats by Honolulu restaurants.

FACTORS AFFECTING MEAT PURCHASES

Size of family, income, racial background, and religious preference were the major factors considered in the analysis of meat purchases by families included in the Honolulu survey. Each of these influences was found to have a positive effect on the meat consumption pattern of the respondent households. These effects are described briefly in the following sections. For a more complete explanation of statistical technique and results, it is suggested that the reader refer to the Appendix.

Size of Family. As figure 1 indicates very clearly, per capita meat consumption declines consistently as the size of the family increases. This tendency is illustrated by the fact that 537 persons in families of 3 averaged 3.32 pounds of meat per capita per week, while 654 persons in families of 6 averaged only 2.59 pounds.

[5] *National Food Situation*, July-Sept. 1953, table 1. U. S. Dept. Agr., Bur. Agr. Econ., July 1953.

Table 6.—Per capita consumption (in pounds) of all meats, Territory of Hawaii and Island of Oahu, 1952.

KIND OF MEAT	BASIS OF NET MARKET SUPPLY		BASIS OF HOME CONSUMPTION ON OAHU	APPARENT INSTITUTION AND RESTAURANT CONSUMPTION ON OAHU*
	Territory	Oahu		
Beef and veal, fresh or frozen	58.8	61.2	46.3	14.9
Pork, all forms	42.2	48.5	40.5	8.0
Lamb and mutton	2.0	2.4	2.6†	1.4†
Miscellaneous processed	18.7	20.1	18.3	1.8
Offal	3.0	3.0	1.9	1.1
Total red meat	124.7	135.2	109.6	27.2
Poultry, all forms	16.1	19.1	20.5†	4.8†
Fish:				
Fresh, frozen, cured	§	§	20.9	
Canned	§	§	3.8	3.7‡#‖
Shellfish:				
Fresh, frozen, canned	§	§	1.1#	
Rabbit	§	§	0.8	**
Total red meat, poultry, rabbit, and fish			156.7	35.7
Total home consumption and institutional use			192.4	

* Oahu net supply per capita less home consumption.
† Consumption rate based on family survey exceeds per capita disappearance based on estimated net market supply.
‡ Estimated on basis of restaurant survey.
§ Data not available.
‖ Includes all fish.
Adjusted to reflect estimated cleaned weight of shellfish.
** Quantity negligible.

Note: Consumption based on market supply represents wholesale weight. Home consumption is based on retail weight.

Per capita consumption in families of 9 persons was only a little over half the rate found in families of 2 persons. Although per capita purchases declined as family size increased, the total number of pounds of meat purchased by each family did increase as the family size became larger. The aggregate purchases did not advance proportionately to the change in size of family, however; and this is the reason for declining per capita consumption as families increase in size. These tendencies are illustrated graphically in figure 2.

As indicated by the survey, when meat consumption and the pattern of family size are extended to embrace all families in Honolulu, it is found that about 41 percent of the estimated 72,500 households were using from 8¼ to 16 pounds of meat each week. Figure 3, in which families are classified as small, medium, and large, shows that there is a heavy concentration of all three sizes of family in the grouping of 8¼ to 16 pounds per week. Only in the case of "small" families (3 persons or less) was there a larger number of units in another use classification, and that was in the "less than 8¼ pounds" category, as might logically have been expected. It is perhaps quite significant that even the "large" families (7 persons or more) occur most frequently in the 8¼ to 16 pounds division. This, of course, is definitely in line

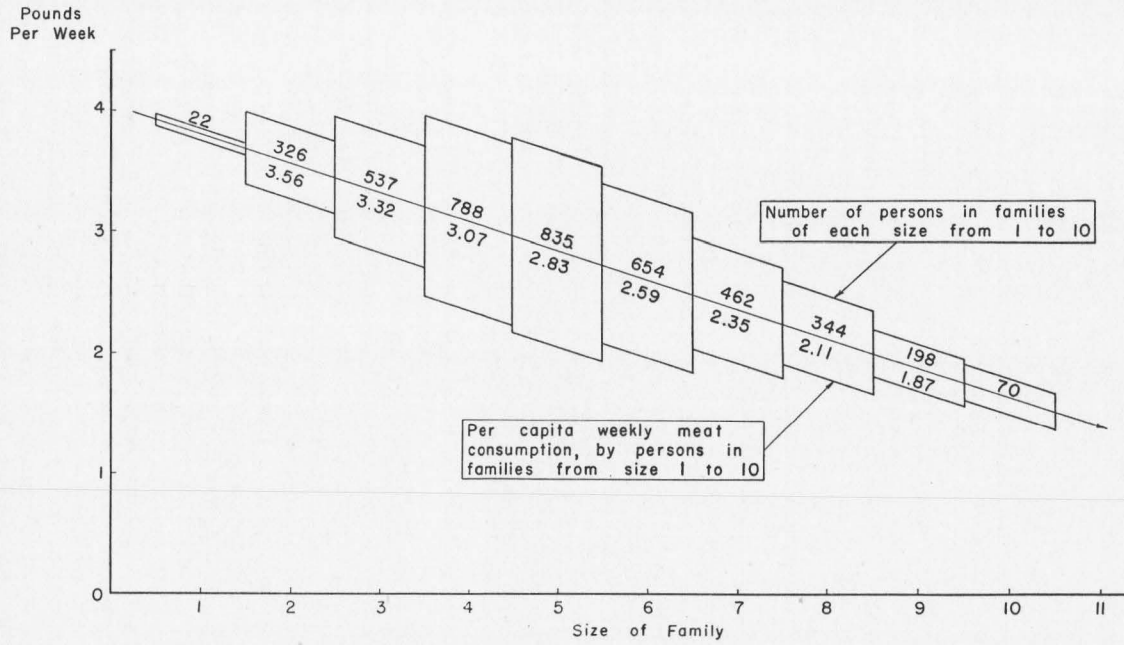

Fig. 1. Relationship of family size to per capita meat consumption, based on survey of 4,236 persons in Honolulu, Hawaii, October 1952

with the finding that per capita consumption declines as the family size increases. Less than 3 percent of the families were using over 32 pounds of meat per week.

Size of family also has a bearing on prices that consumers pay for meat; and this, of course, affects the kinds and cuts purchased. Families of 4 or less members paid an average of 81.3 cents per pound for meat purchased during the survey period, while larger families (5 or more) averaged 75.4 cents per pound. This result is not surprising because it is generally assumed that people with large families may have lower per capita income and are more likely to buy the less expensive meats.

Income. Family income is a major factor influencing the use of meats by Honolulu families. Figure 4 shows the relationships between income and the quantity of certain meats used. From figure 4 it is apparent that the consumption of all meats increases as income rises but that there is considerable difference in the rate of change for the different kinds of meat. Beef and ham show the greatest relative increase as income advances. At the other extreme are fish and veal for which the increase in use is almost nil as income rises. Fresh pork and poultry purchases change at substantially the same rate throughout the income scale, although the quantity of pork used is greater. In terms of quantity consumed per family per week, beef advances from 2 pounds at the $100 per month level to 4.5 pounds at the $500 per month level. With the same change in income, the quantity of fish used increases only about 0.1 pound, from 1.65 to 1.75 pounds. Both fresh pork and poultry show an increase of 1 pound per family per week as income moves from $100 to $500 per month, but the percentage change is somewhat greater for poultry than for pork.

Considerable disparity is found among the different types and cuts of the various meats when consumption of each is related to family income. These variations are set forth graphically in figures 5, 6, and 7. Contrary to common assumption, the use of the higher priced beef steaks showed less increase as income advanced than did hamburger or the cheaper cuts of beef. This showing is not illogical, however, in view of the limited choice available in preparation of steaks for eating. Pork loins, pork chops, and chicken all have relatively high rates of change as income increases. Bacon almost doubles from 0.4 pound per family per week when income is $100 per month to 0.75 pound at the $500 per month level. Hawaiian fish and spareribs show the opposite tendency and actually show a decrease in quantity consumed as family income advances. Both shellfish and mainland fish are used in somewhat greater volume as family income advances.

The effect of family size at certain income levels on meat purchases per family per week is indicated by figure 8. Families with the higher average incomes show a higher per capita rate of meat consumption, but the difference between the rates is less from the middle to the top brackets than it is from the middle to the low income groups. For example, for a family of 5 the meat purchases per week were 7.4 pounds when the income averaged $130 per month, 12.2 pounds when the income was $310 per month, and 13.7 pounds when the income averaged $490 per month. This showing tends to support the view that meat consumption increases reasonably fast as people move from the lower brackets toward the median point in the income scale, but that the rate of increase in use of meat slows down to a marked extent as family income goes beyond the mid-point. Declining per capita purchases of meat as family size increases are again apparent at all of the income levels. This tendency is more apparent for the middle and high income groups, however, than it is for the low income bracket.

Apparently income has somewhat less influence than size of family on the price paid for meats. Among the families included in the survey sample, those whose incomes were under $400 per month paid an average of 77.1 cents per pound for

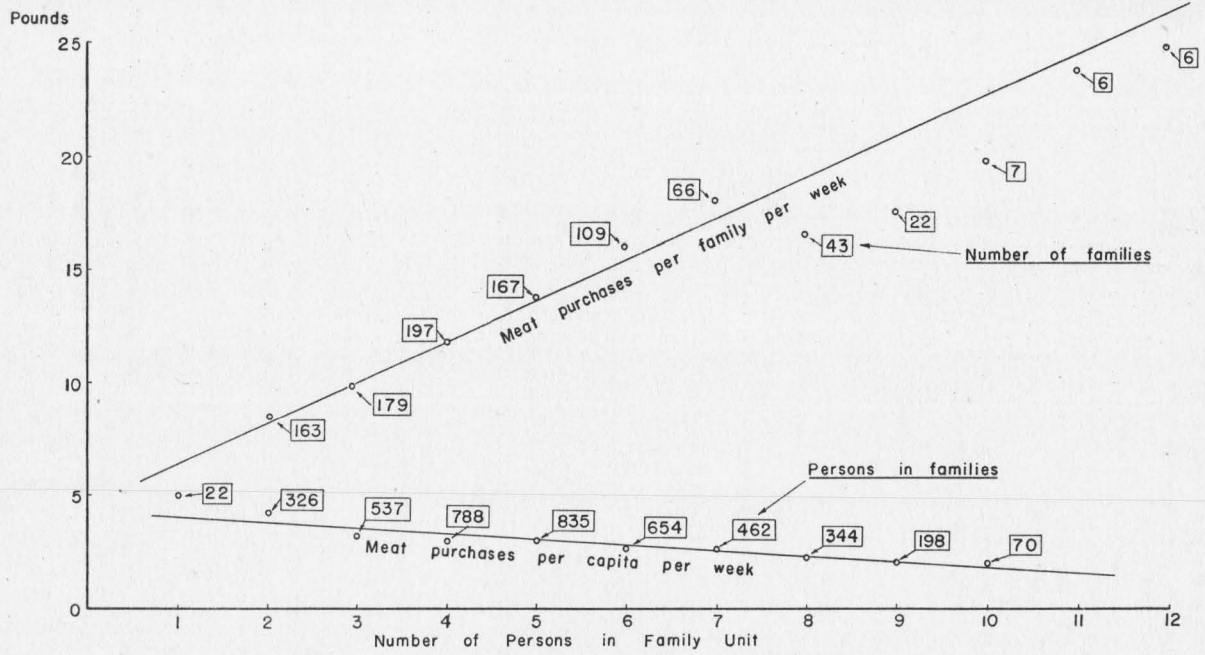

Fig. 2. Effect of family size on meat consumption, based on survey of 987 families in Honolulu, Hawaii, October 1952

meats purchased, while the households reporting incomes of over $400 per month averaged 79.2 cents per pound. This difference of 2.1 cents per pound is only about one third of the difference noted above between comparative prices paid by large and small families.

Racial Background. As was noted above, the population of Hawaii is composed of several distinct racial groups. Racial influences affect eating habits, and it is therefore important to measure meat consumption by each of the major racial groups if the use of meats by Honolulu consumers is to be understood. In a recent study[6] of family consumption of certain vegetables in Honolulu, it was found that each race had borrowed in varying degrees the eating habits of others to the point where almost three quarters of the families used a mixed diet. The greatest tendency to cling to traditional eating habits was found among the Caucasians. In the survey of meat purchases, the per capita consumption has been summarized for the Japanese, Chinese, Caucasians, and Hawaiians. These are the four major racial groups in the city of Honolulu itself. Filipinos make up an important segment of Hawaii's population, but they are located largely in rural areas.

From the contents of table 7 it appears that the Hawaiians and Caucasians consume the largest quantities of all meats, with averages of 3.22 and 3.19 pounds, respectively, per capita per week. The Chinese approached these levels, however, with an average of 3.04 pounds. As a group, the Japanese were found to be the users of the smallest amount of meats in their diets, with average weekly purchases per capita totaling but 2.35 pounds. Use of relatively small quantities of meat by the Japanese must be attributed mostly to eating habits, since this and other surveys made in recent years indicate that the income level of Oriental families in Honolulu is sufficiently high to permit greater use of meats by that group.

Table 7.—Weekly per capita consumption (in pounds) of certain meats, by racial background of family, Island of Oahu, Hawaii, October 1952.

KIND OF MEAT*	CAUCASIAN	CHINESE	HAWAIIAN†	JAPANESE
Beef	1.10	.93	.97	.59
Pork	.23	.62	.45	.28
Fish	.10	.26	.39	.28
Poultry	.24	.39	.20	.26
Miscellaneous‡	1.52	.84	1.21	.94
All meats	3.19	3.04	3.22	2.35

* Fresh or frozen only. All processed meats included in miscellaneous classification.
† Includes part-Hawaiian.
‡ Consists mostly of processed meats, including ham and bacon and canned items.

Note: Consumption is based on retail weight. See Appendix for alternative interpretation of per capita consumption, by racial background.

On the basis of the kinds of meat purchased by the four groups, some important deviations from the pattern for all meats are to be noted. For beef, the relationship of the groups to one another is about the same as for all meats, except that the Japanese use proportionately less beef. The range in per capita weekly consumption of beef is from a high of 1.10 pounds for the Caucasians to a low of .59 pound for the Japanese. In the use of fresh and frozen pork, the Chinese lead with .62 pound per person each week. They are followed by the Hawaiians, Japanese, and Caucasians, each of which uses .45, .28, and .23 pound, respectively. Hawaiians use

[6] Robert H. Reed and C. Richard Creek. *Family Consumption of Certain Fresh Vegetables in Honolulu.* Hawaii Univ. Agr. Econ. Bul. 5, June 1953.

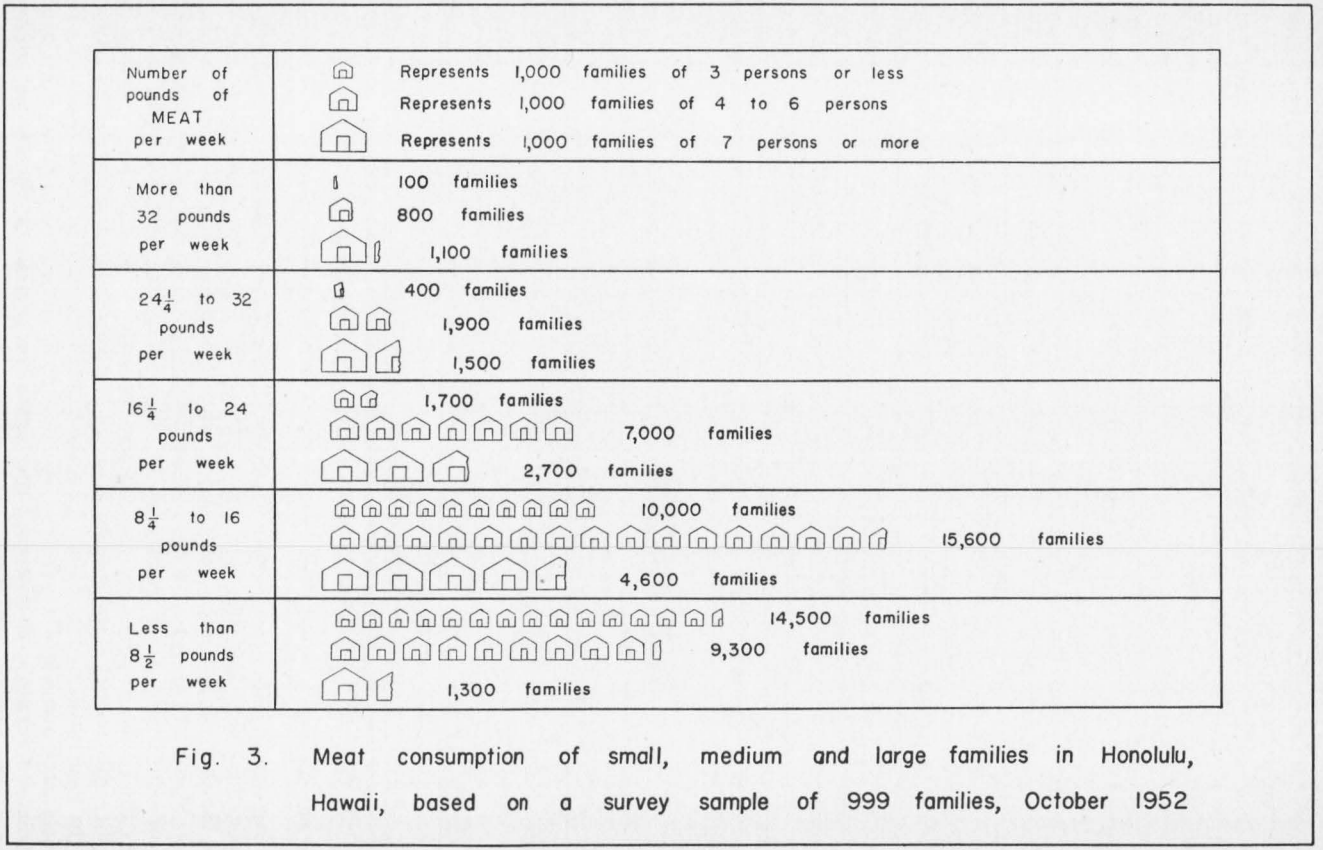

Fig. 3. Meat consumption of small, medium and large families in Honolulu, Hawaii, based on a survey sample of 999 families, October 1952

considerably more fish than the other three ethnic divisions. For the Hawaiians, the rate of fish consumption is .39 pound per person per week, while, among the other groups, the rate ranges from .10 to .28 pound. The apparent range in the consumption rate among the four population groups is not so extreme for poultry as it is for beef and pork. It is the Chinese who lead in the use of poultry. They have a weekly average of .39 pound per capita. Japanese and Caucasians, with averages of .26 and .24 pound, respectively, use about the same amount of poultry in their diet. The Hawaiians are at the foot of this scale with an average weekly consumption of .20 pound per person. The Chinese reported use of relatively less processed meat than did the other three groups, but even for the Chinese these miscellaneous meats made up over a quarter of the total.

Religious Preference. Only a minor part of the families included in the survey sample indicated that religious affiliation affected their meat-eating habits. Over two thirds of those who did indicate that religion is a factor in their use of meat were of the Catholic faith. The balance were scattered among the Jewish, Seventh Day Adventist, Buddhist, and some few Protestant denominations. For the most part, this phase of the survey did not result in any new findings. It did confirm the generally accepted belief that those persons who adhere to the Jewish and Seventh Day Adventist religions generally do not eat pork. Abstinence from use of certain types of meat on certain days by adherents of the Catholic faith does not result in consumption of fish at a rate that is above the average for all groups in Hawaii; in fact, the rate of fish consumption by Catholics is moderately below the general average for all families. On the basis of the Honolulu survey it would be difficult to maintain that religion has more than a minor effect on the over-all pattern of meat consumption in this market area.

MEAT PREFERENCES OF HONOLULU FAMILIES

One of the principal objectives of the survey relating to the use of meats by families in the Honolulu area was to establish the pattern of preferences among the consuming public in this market. Livestock producers in the Islands, as well as those dealers who ship meat into the Territory from outside sources, have a real interest in the reasons for consumer preference of either local or mainland meats. In this survey, only limited attention was devoted to preferences as they relate to classes or kinds of meat. Major emphasis was directed to consideration of preferences stemming from origin of supply, i.e., local versus mainland. The discussion that follows is along commodity lines and relates to beef, pork, and poulty. These three are the particularly important meats from the dual standpoint of island production and volume consumed in Honolulu.

BEEF PREFERENCES

Among the 978 families who responded to the survey questions on beef preferences, there were 614 who said they preferred the local meat. About one fifth, or 198 families, indicated that they had no choice between island beef and mainland beef. Mainland beef was preferred by another 138 families, and 28 said they did not know which they would prefer. On the basis of racial background (see table 8), only the Caucasians, as a group, preferred mainland beef to the local product. All of the other racial groups showed a strong preference for island beef. The attitude of the Caucasians may be biased to some extent because this group contains a relatively large number of newcomers who tend to be prejudiced in favor of mainland products. Caucasians also showed the highest proportion of "no choice" replies, 37 percent stating no preference.

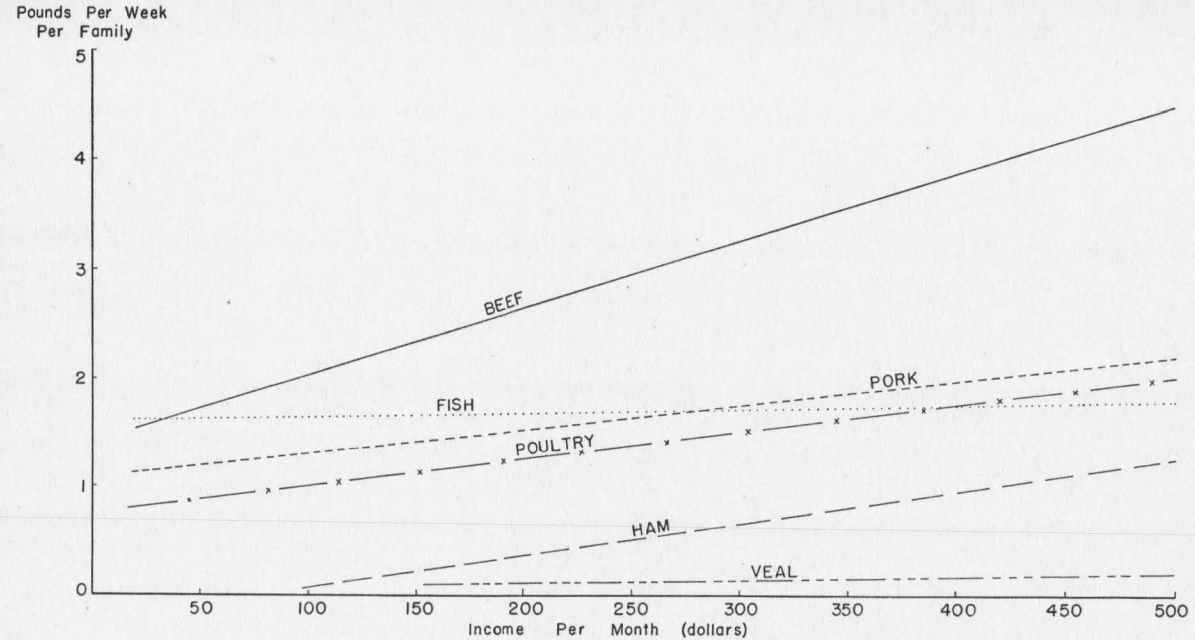

Fig. 4. Effect of family income on meat consumption, by kinds of meat used, based on survey of 1,066 families, Island of Oahu, Hawaii, October 1952

Table 8.—Beef preferences of 978 Honolulu families, by origin of meat supply and by racial background of family, October 1952.

RACIAL BACKGROUND	MAINLAND BEEF	ISLAND BEEF	NO CHOICE	DON'T KNOW	TOTAL
Japanese	37	276	60	6	379
Chinese	10	82	20	3	115
Caucasian	68	62	80	9	219
Filipino	1	16	—	—	17
Portuguese	4	46	8	2	60
*Hawaiian**	*11*	*83*	*20*	*3*	*117*
Mixture	2	23	2	3	30
Other	5	26	8	2	41
Total	138	614	198	28	978

* Includes part-Hawaiian.

Note: See tables A-6 and A-7 of the Appendix for reasons for preference of mainland beef and island beef.

In regard to the reasons for preference of mainland beef, about one fourth of those stating such a preference said that lower price was the major factor in their choice. Another 30 of the 138 families preferring mainland beef believed it tastier than the island product. Seventeen families preferred beef from the Mainland, but did not know why. The remaining families had a variety of miscellaneous reasons for their preference.

Among the 614 respondents who preferred island beef, over three fourths (470 families) said that the local beef is fresher or tastier than the imported meat. Eighty-eight families had reasons such as price, local origin, color, and other factors as the basis for their choice. The remaining 56 units did not have any stated reason for their preference of island beef.

Family income appears to have only limited influence as a factor determining preference for either island or mainland beef. There is some tendency for higher income groups to prefer the mainland product, but this observation is tempered by the fact that Caucasians with their acknowledged preference for mainland beef are relatively more numerous in the higher income brackets. As indicated above, only a minor part of all survey respondents, grouped along racial lines, appeared to base their choice of island or mainland beef on the relative price of the competing meats. It thus becomes quite evident that, during the period of the survey, Honolulu consumers were influenced seriously by price only where mainland beef was preferred. Further, there was no significant difference in price consciousness among the income groups.

PORK PREFERENCES

A total of 957 families responded to the section of the survey questionnaire which related to pork preferences. Such preferences relate to the fresh or frozen product only. This is because substantially all processed pork sold in Hawaii is of mainland origin. As table 9 indicates, about 53 percent of the respondents, or 502 units, preferred island pork, while 230 families (24 percent) said that they consider mainland pork preferable. Twenty percent, or 194 families, had no choice between the two types of pork, and only 31 respondents said that they did not know which they preferred. It is apparent from the survey results that local pork enjoys relatively less preference among Honolulu consumers than does island beef. Where beef of local origin commands the preference of 63 percent of the families surveyed, pork produced in the Islands was preferred by only 53 percent of the families. Racial

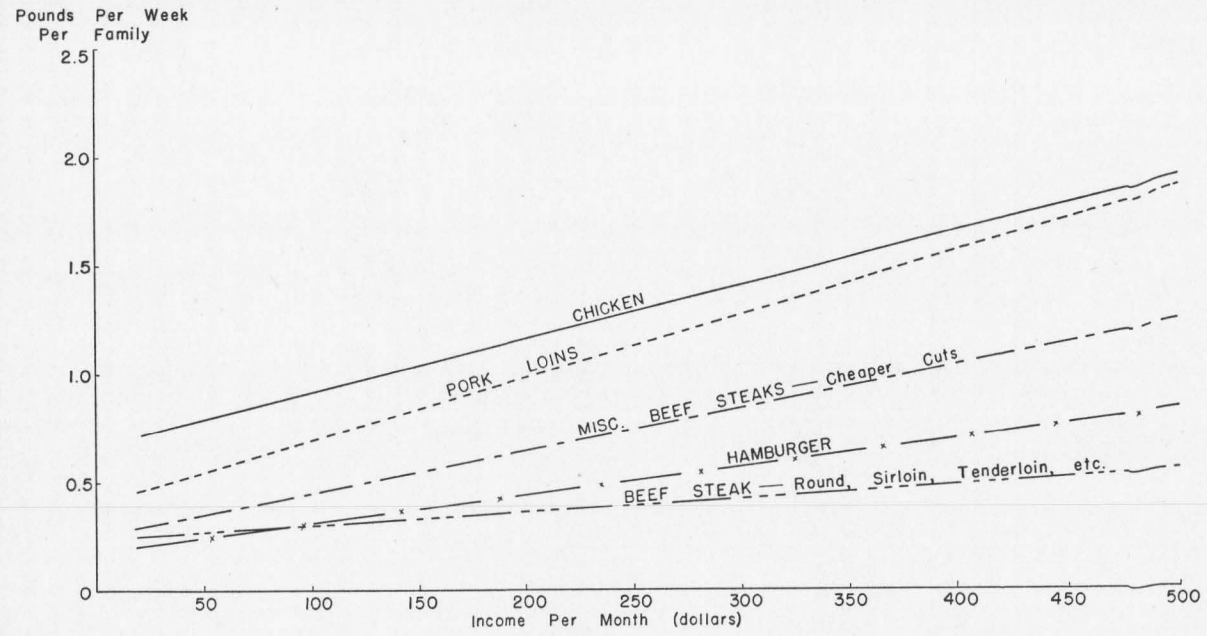

Fig. 5. Effect of family income on meat consumption, by cuts and types of meat, based on survey of 1,066 families, Island of Oahu, Hawaii, October 1952

Table 9.—Pork preferences of 957 Honolulu families, by origin of meat supply and by racial background of family, October 1952.

RACIAL BACKGROUND	MAINLAND PORK	ISLAND PORK	NO CHOICE	DON'T KNOW	TOTAL
Japanese	53	232	86	4	375
Chinese	8	91	15	1	115
Caucasian	102	38	51	15	206
Filipino	3	12	—	1	16
Portuguese	27	25	7	1	60
Hawaiian*	20	68	23	6	117
Mixture	8	11	7	3	29
Other	9	25	5	—	39
Total	230	502	194	31	957

* Includes part-Hawaiian.

Note: Preferences relate to fresh or frozen pork only. See tables A-8 and A-9 of the Appendix for reasons for preference of mainland pork and island pork.

origin has a relatively important influence on pork preference. The Caucasian group has a strong preference for mainland pork, with 50 percent preferring such meat against 18 percent choosing local pork. The Portuguese, as a subgroup of the Caucasians, also show a slight preference for the mainland product. In varying degrees, the Oriental, Filipino, and Hawaiian groups show a marked preference for the island pork. To a lesser degree, the same is true of families having a mixed racial background.

Of the 230 families indicating a preference for mainland pork, there were 58, or about 25 percent, who based their choice on lower price. Another 51 households (22 percent) said they preferred the imported pork because it is not as fat or soft as the local product. This response is not surprising in light of the distinct preference for lean pork that has developed on the Mainland. Local producers must give consideration to this factor if island pork is to displace the imported product. Twenty-eight respondents considered mainland pork tastier, and the balance of the group had various reasons or did not know why they preferred the mainland pork.

Local pork is preferred by 364 of the 502 families, because the island product is considered fresher and tastier than the imported meat. This is roughly the same proportion that was found preferring island beef for the same two reasons. The tendency of pork fat to become rancid in storage may be partially responsible for the opinion that fresh island pork is tastier than the frozen product from the Mainland. Price was not a factor among those preferring local pork, since the island product generally commands a premium over the imported pork. It should be noted, however, that the survey of preference for pork relates only to the cuts that are purchased in the fresh and frozen state. This excludes smoked ham and bacon which are wholly of outside origin. Sixty-four households, or 13 percent, did not know why they preferred local pork, and the remaining families (about 13 percent) gave various reasons, such as color, more fat, and local product, in explaining their choice of island pork. Racial influences have little effect on the relative importance of reasons advanced for preference of either island or mainland pork. The same factors were found to be of major importance to each of the several racial groups included in the Honolulu meat survey.

Family income has no significant effect on the preferences of Honolulu consumers for island or mainland pork. To even a lesser extent than was noted in reference to beef, there is a slight tendency for a larger percentage of families in the higher income groups to prefer the mainland product. This tendency is not

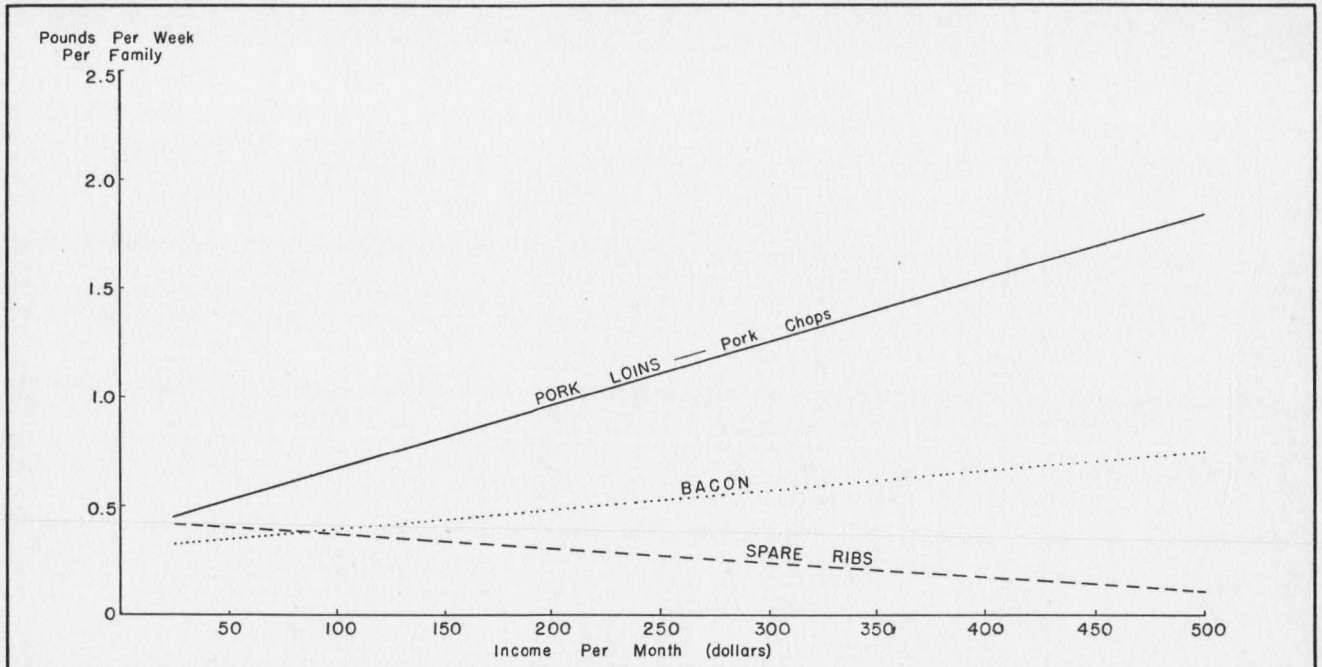

Fig. 6. Effect of family income on meat consumption, by cuts and types of meat, based on survey of 1,066 families, Island of Oahu, Hawaii, October 1952

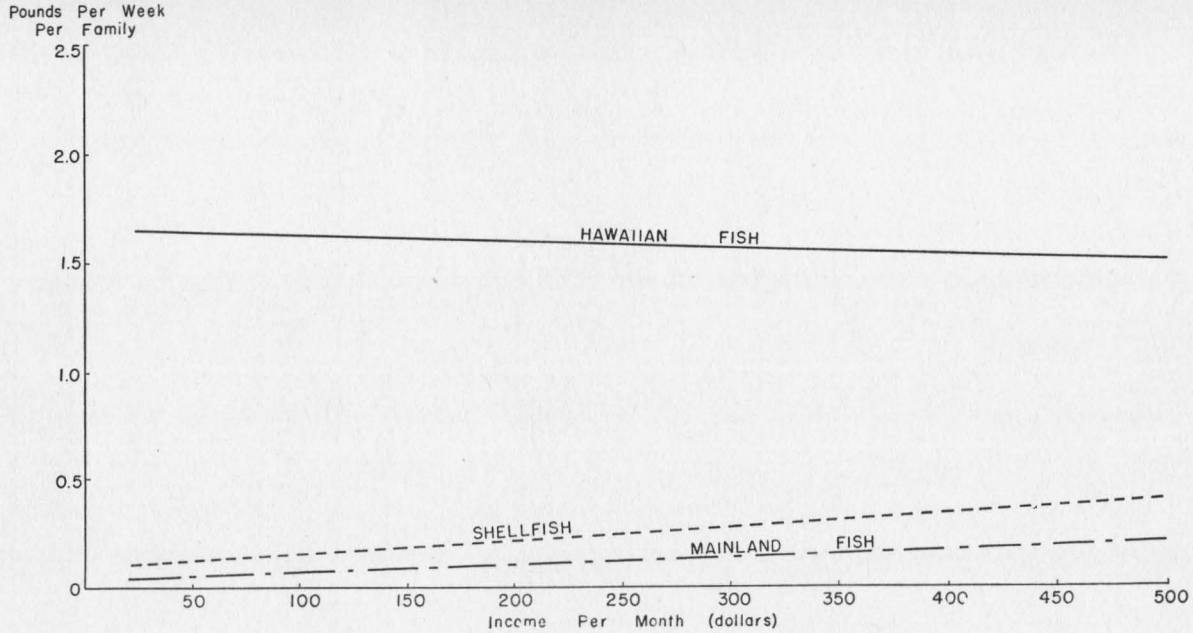

Fig. 7. Effect of family income on meat consumption, by cuts and types of meat, based on survey of 1,066 families, Island of Oahu, Hawaii, October 1952

unexpected, however, in view of the relatively greater numbers of Caucasians in the upper income brackets. In general, it is recognized that price is a major influence in determining the commodities of a given type that consumers with varying incomes will buy. In determining whether island pork or mainland pork will be purchased, however, the relative price of the two types of meat has little effect on preference. Among the 732 families expressing a preference, almost three quarters preferred island pork even though it sells at a premium over the mainland product. Price was an important factor influencing those who prefer mainland pork, but in this instance relatively more of the high income families would appear to be price conscious, since there was a greater concentration of the mainland preference in the upper levels of income. It will be noted that these observations on the effect of both family income and price on pork preferences are substantially the same as those made in connection with beef. Apparently the same type of product differentiation, based in large part on source of supply, is effective as an influence on consumer reaction to both beef and pork in the Honolulu market.

POULTRY PREFERENCES

About 60 percent, or 582 units, of the 976 families who answered the survey questions on poultry preferences said that they preferred the island product. Mainland poultry was preferred by 187 households or 19 percent. Another 192 households said they had no choice between the two types of poultry. Only 15 respondents said they did not know which meat they preferred. Along racial lines (see table 10), there was a wide variation in attitude, however. The Oriental group showed overwhelming preference for the local product. To a lesser extent but still displaying a strong leaning toward island poultry were the Hawaiian and Portuguese groups. The Caucasians again preferred the mainland product almost two to one, with about one third indicating no choice. Among the families having a mixed racial origin, there was a slight preference for the island poultry, but the margin was not great.

Among the 187 families preferring mainland poultry, 74 gave lower price as the major reason for their preference. No other single factor was significant among these responses to the questionnaire, although 12 households said they thought the mainland poultry was tastier. Over three fourths (448 units) of the 582 families that expressed a preference for island poultry based this preference on the consider-

Table 10.—Poultry preferences of 976 Honolulu families, by origin of meat supply and by racial background of family, October 1952.

RACIAL BACKGROUND	MAINLAND POULTRY	ISLAND POULTRY	NO CHOICE	DON'T KNOW	TOTAL
Japanese	41	275	61	2	379
Chinese	7	84	21	3	115
Caucasian	90	48	71	7	216
Filipino	1	14	2	—	17
Portuguese	12	38	10	—	60
Hawaiian*	16	81	17	3	117
Mixture	12	15	3	—	30
Other	8	27	7	—	42
Total	187	582	192	15	976

* Includes part-Hawaiian.

Note: See tables A-10 and A-11 of the Appendix for reasons for preference of mainland poultry and island poultry.

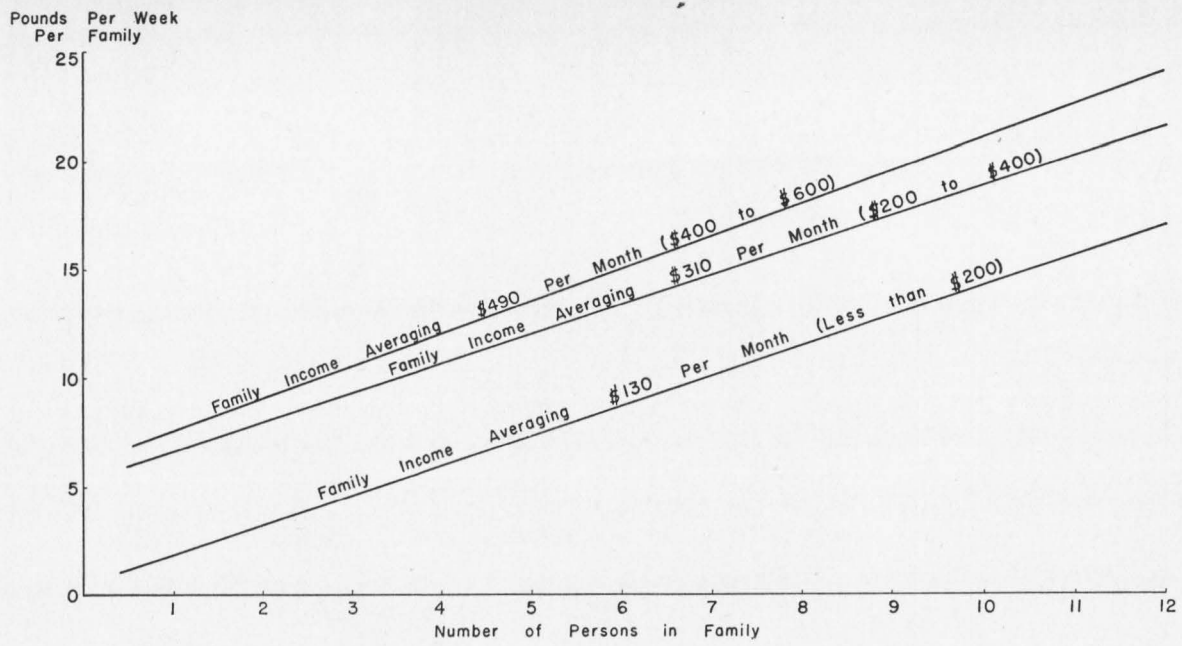

Fig. 8. Relationship of family size and family income to meat consumption, based on survey of 1,066 families, Island of Oahu, Hawaii, October 1952

Table 11.—Poultry preferences of 976 Honolulu families, by form of meat purchased and by racial background of family, October 1952.

RACIAL BACKGROUND	DRESSED	DRESSED AND DRAWN	CUT AND PACKAGED	ALIVE	NO CHOICE	OTHER	TOTAL
Japanese	18	218	87	23	30	3	379
Chinese	3	57	14	26	11	3	114
Caucasian	1	62	118	23	12	1	217
Filipino	1	4	4	7	1	—	17
Portuguese	3	27	19	8	2	1	60
Hawaiian*	2	56	28	17	13	1	117
Mixture	2	13	14	1	—	—	30
Other	2	18	10	8	3	1	42
Total	32	455	294	113	72	10	976

* Includes part-Hawaiian.

ation that the local product is fresher and tastier. Only 33 of the 582 families preferring island poultry gave no reason. The remaining 101 households had a variety of reasons for their choice of the local product.

In the Honolulu survey, several preference questions relating to poultry only were included in the schedule. One of these questions was designed to determine the form in which consumers prefer to purchase their poultry. The response indicated that 455 households (almost half of the 976 families responding) preferred poultry which is dressed and drawn (table 11). Another 294, or 30 percent of the total, preferred poultry that is cut up and packaged. Poultry in the live form was the choice of 113 families, while 32 said they wanted their poultry dressed only. The others among the sample had no choice or had miscellaneous preferences. On the basis of racial background, there are some interesting and important differences in the form preferences. The Chinese and Filipinos showed the greatest preference of all racial groups for poultry in the live form. Poultry cut up and packaged found most favor among the Caucasians and mixed groups. Preference for dressed and drawn poultry was most distinct among the Japanese who, in contrast to the Chinese, buy very little poultry alive for killing and dressing at home. These expressed preferences, particularly the heavy concentration on the more advanced forms of processing, are significant to all poultry processors and dealers who are interested in supplying the local market.

Reasons for purchase of poultry in lieu of other meats are tabulated in table 12. Of the 508 families responding to this inquiry, 266 said that desire for variety in the diet was responsible for their selection of poultry. Only 46 households, or 9 percent of the group, gave "low price" as the reason for buying poultry. Habit accounted for the choice of poultry in 98 cases, while another 35 families bought poultry because they wanted it for use on some type of holiday. Fifteen families did not have any particular reason for buying poultry; and there were 48 units that gave miscellaneous answers, none of which occurred with sufficient frequency to justify separate tabulation. There was little difference among racial groups as far as relative importance of the reasons for using poultry was concerned.

In analyzing the effect of income on poultry preference, it was again found that there is a slightly stronger inclination for high income groups to select mainland poultry in preference to the local product. It is probable that the principal reason for this tendency is the same for poultry as was noted in connection with beef and

pork; i.e., relatively higher concentration of Caucasians in the upper brackets. Most poultry in the cut-up and pan-ready form that is generally available in the Honolulu market has thus far been of mainland origin. It is this packaged, frozen product that has particular appeal to the higher income groups. On the basis of the edible portion only, it is likely that poultry meat in this form is no more expensive than the island meat that is usually sold in some other form.

USE OF MEAT BY HONOLULU RESTAURANTS

It is estimated that restaurants in the Honolulu market area absorb from 20 to 30 percent of the total volume of meats consumed in the area. The importance of restaurants in Hawaii as an outlet for meats is accentuated by the relatively large number of transients, particularly tourists and military personnel, who depend upon the local eating places for all or part of their sustenance while they are in the Islands. In the survey of eating places, 45 individual establishments co-operated by listing their purchases of meats during the entire month of October 1952. These same restaurants also provided certain information concerning their preferences for mainland and island meats.

QUANTITIES USED

By expanding the consumption data obtained from the sample of 45 restaurants, it is estimated that all 921 eating places on Oahu used a total of 1.4 million pounds of meats during October 1952 (see table 13). If the assumption is made that October was a representative month, as far as meat consumption by restaurants is concerned, then the annual use rate for 1952 would have been about 16.8 million pounds. This would mean a per capita rate of over 51 pounds for the 325,797 people who were residents of Oahu as of July 1, 1952. Such a figure is 45 percent greater than the "apparent" per capita consumption rate of 35.7 pounds (table 6) for all of Oahu's institutional trade. Thus, it would appear that there was an upward bias in either the home survey or the restaurant data, or perhaps to some degree it may have prevailed in both investigations.[7] The lower rate of 35.7 pounds indicated by table 6 is close to 20 percent of the total "apparent" meat consumption on Oahu in 1952, while the higher rate of 51 pounds is closer to 30 percent of the total.

Table 12.—Poultry preferences of 508 Honolulu families, by reason for use of meat and by racial background of family, October 1952.

RACIAL BACKGROUND	LOW PRICE	HABIT	HOLIDAY	VARIETY	DON'T KNOW	OTHER REASONS	TOTAL
Japanese	15	39	12	101	7	24	198
Chinese	7	14	4	38	—	5	68
Caucasian	10	22	4	65	2	6	109
Filipino	1	1	2	2	1	—	7
Portuguese	2	7	4	17	1	7	38
Hawaiian*	3	7	8	22	3	4	47
Mixture	4	3	—	9	—	1	17
Other	4	5	1	12	1	1	24
Total	46	98	35	266	15	48	508

* Includes part-Hawaiian.

7 A more complete discussion of this defect and the reasons for it may be found in the Appendix.

Despite the indicated difficulty of reconciling the restaurant consumption rates obtained by the two different methods, the restaurant survey has provided a very satisfactory record of relative quantities of the various meats that are used by Honolulu restaurants. This distribution for all of the major kinds and types of meat is given in table 13. Beef alone makes up almost 41 percent of the total, and pork in its various forms accounts for another 19 percent of all meats used by the restaurants. The third ranking classification is poultry with 15 percent, while fish total over 12 percent and are thus in fourth place. Lamb and veal are the most important single items over and above the quantities accounted for by the first four groups.

In relation to the meat consumption pattern in Honolulu homes, the local restaurant trade used considerably different proportions of certain meats. Beef was the mainstay of the restaurants; and, as such, it accounted for about 10 percent more of the total than was found among the households; i.e., 40.6 percent versus less than 30 percent. On the other hand, pork in its various forms was relatively more important in the homes. There it made up over 25 percent of the total meats consumed, compared to 19 percent in the restaurants. The use ratio for poultry as a group was somewhat higher for restaurants (14.7 percent versus 13.0 percent). Households had a considerably higher proportion of chicken than the eating places, but the reverse was true for turkey and ducks: restaurants used some six times as much proportionately than did the individual homes. Fish was almost half again as important in homes as it was in restaurants, the percentages being 17.0 and 12.4

Table 13.—Estimated consumption of meats by 921 restaurants, Island of Oahu, Hawaii, October 1952.

ITEM	QUANTITY CONSUMED	PROBABLE ERROR*	CONSUMPTION RATIO
	1,000 lbs.	*1,000 lbs.*	*Percent*
Beef	569	±40	40.6
Pork:			
Fresh and frozen	166	±12	11.8
Ham	73	± 5	5.2
Bacon	28	± 2	2.0
Lamb	64	± 5	4.6
Veal	48	± 3	3.4
Poultry:			
Chicken	105	± 7	7.5
Other	101	± 7	7.2
Fish:			
Fresh and frozen	122	± 9	8.7
Shellfish	52	± 4	3.7
Canned meat	15	± 1	1.1
Sausage and luncheon meats	29	± 2	2.1
Offal	23	± 2	1.6
Miscellaneous	7	± 0.5	0.5
Total	1,402		100.0

* The probable errors listed are those to be expected from sampling. The error due to an upward bias, discussed in the text, was not considered in the calculation of this column of probable errors.

Note: Consumption is based on wholesale weight with fresh and frozen meats in the dressed form. See Appendix for sample design and statistical pocedure used in obtaining these estimates.

Table 14.—Meat preferences of 45 restaurants, Island of Oahu, Hawaii, October 1952.

ORIGIN OF SUPPLY	KIND OF MEAT		
	Beef	Pork	Poultry
Mainland	24	34	27
Island	16	8	10
No choice	4	3	7
Mixed	1	0	1
Total	45	45	45

of all meats, respectively. Lamb and veal, however, made up 8 percent of all meats used by the restaurants, while in the households these items accounted for only 2.3 percent of the total. These differences are not unexpected in view of the fact that 40 of the 45 restaurants served American-type dishes almost exclusively and thus did not reflect the diversity of cooking habits found among the households in Hawaii.

PREFERENCES

All of the restaurants surveyed were asked to state their preferences for beef, pork, and poultry, according to origin of supply, and to indicate the reasons for their preference in each case. The preferences, by origin of supply, are tabulated in table 14. Mainland meats were preferred in all three cases, but the margin of preference varies among the kinds of meat. Island-produced beef made a much better showing than either pork or poultry originating in the Territory. Sixteen of the 45 respondents said that they preferred local beef largely because it is fresh and also costs less. The 24 restaurants preferring mainland beef gave as their principal reasons: better and more uniform quality, including grading and aging, and more selective choice of cuts available in the imported product.

Island pork was preferred by only 8 out of 45 eating places. These 8 establishments like the local product mostly because it is believed to be fresher and tastier. The 34 restaurants selecting mainland pork attributed their choice to lower price, less fat, and better range of cuts available. The same reasons for preference of mainland pork were expressed by head butchers in Honolulu retail establishments.

There were 10 places among the 45 restaurants that preferred local poultry, and that preference was again based mostly on freshness of the island meat. Mainland poultry was given preference by 27 establishments participating in the survey. Lower price was the major factor responsible for use of imported poultry. Other important factors mentioned by those who preferred mainland poultry were the uniform size of the dressed birds, regularity of supply, and ready availability of stock from which to draw as the need arises. The reasons advanced by restaurants in explaining their preferences for island and mainland poultry, as well as beef and pork, should serve as an effective guide to those producers and dealers who are endeavoring to capture a larger share of the local market.

APPENDIX

SAMPLE DESIGN

For sampling purposes, the Island of Oahu was stratified geographically into census tracts. From each census tract of 3,000 persons or more, one or two enumeration districts, depending upon population, were chosen at random. Any census

tract of less than 3,000 was combined with the tract next on the list. The number of households or dwelling units[8] selected from the designated enumeration district(s) of a census tract was made proportional to the population of the census tract. A street in each enumeration district was selected at random; or, if necessary, more than one street was selected. On each such street houses were taken at random. One thousand and sixty-six households were questioned in all, 67 of them being rural. There were 4,759 persons in all households, 291 of them being in rural households. This constitutes approximately 1.5 percent of Oahu's total population. Figure A-1 gives a breakdown of households according to the number of persons in each.

In tabulating results, rural households were usually omitted, and it was often necessary to omit others because of inappropriate responses. Consequently, there is usually a total of less than 999 households in a tabulation.

QUESTIONNAIRE

The questionnaire was pretested by several trial interviews. It was found to be satisfactory if properly used.

Interviewers were carefully selected, thoroughly briefed, and given a 6-page memorandum as a guide. There were then assigned a quota of questionnaires for each enumeration district.

Identification of the sample dwelling units by street and number was predetermined. The time of each interview was arranged by the interviewer and the respondent.

Question 1 of the questionnaire was designed to obtain from each respondent an accurate description of each purchase of meat "in the past 7 days," including for each purchase the kind, cut, state (fresh, frozen, smoked, canned, etc.), weight, and price of the meat, and how it was cooked. If any meat eaten "in the past 7 days" was home-produced, caught, received as a gift, or taken out of a home freezer, this was recorded and a description was requested, including for each item eaten the kind, cut, state (fresh, frozen, smoked, canned, etc.), and weight of the meat.

The remaining three and one-half pages of the 5-page questionnaire were devoted to questions of preference and motivation, and to other questions directly or indirectly related to meat buying. The preference questions dealt, first, with the choice between mainland products and island products and, second, with the choice between various types of commercial processing and packaging. Next came cooking preferences: Oriental, Hawaiian, etc. Usually, following each question of preference, came a question to determine the reason for the preference. Next were questions relating food habits to race and religion. Question 11 was devoted to over-all food expenditures "in the past 7 days." The last question, number 15, was devoted to the family income, the size of family, and the ages of family members.

When all of the questionnaires were completed, an IBM expert supervised the coding of the answers and the punching of cards. The problem of what IBM tabulations would be needed was considered at length. IBM sheets were then run off and the statistical work was begun.

RESTAURANT SURVEY

At the time of the restaurant survey, October 1952, there were 936 restaurants on Oahu, employing 5,896 persons.

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[8] A household or dwelling unit was defined as any family group, whether living in half a house, a duplex, or an apartment. Families living in the same house but eating separately were considered as separate families. If several families ate at the same table, they were considered to be one family for the purpose of the survey.

In considering the sample for estimating the restaurant meat consumption, it became apparent that there were two variables which could be used to improve accuracy. They were, namely, size of restaurant and liquor policy.

The number of a restaurant's employees was used as an approximate measure of restaurant size. For each restaurant on Oahu, the number of employees and the answer to the question of whether or not liquor was being served were obtained from the Board of Health records or, if necessary, by directly telephoning to the establishment itself.

Fifteen establishments were classified as serving "mostly liquor." The meat consumption of these "restaurants" was considered negligible and was therefore disregarded. Of the remaining 921 restaurants on Oahu, it was found that 166 served liquor and 755 did not; 140 had nine or more employees, while 781 had fewer than nine. One restaurant with 411 employees was given separate consideration.

The sample consisted of 45 restaurants of all sizes, both liquor-serving and non-liquor-serving. The consumption estimates for the restaurants in each stratum of the restaurant population were made to depend upon the number of employees and the number of restaurants in that stratum, and, of course, upon the appropriate sample values. Wherever possible the sample values were obtained by actual inspection of the records of the restaurants. However, the difficulties involved in making such a survey accurately are greater than might at first be supposed. It is probable that an over-all upward bias exists in the estimate of restaurant meat consumption because approximately one half of the restaurants selected for sampling refused to co-operate. There was a much higher proportion of refusals among the small and medium sized restaurants than among the large ones. Although the smaller restaurants were given their proportionate representation, it is probable that those co-operating were among the more successful. Many of the smaller restaurants had no records from which to obtain data and depended upon memory and guesswork to estimate the month's consumption.

ANALYSIS OF VARIANCE

The figures shown in table 7 of the main report were obtained by finding a per capita figure for each household in each category. From these figures were found the mean per capita for each category. If per capita figures had been calculated directly by dividing the consumption in each category by the total persons in each category, it would have made little difference in the results. The purpose of using the more complicated approach was to permit an analysis of variance of the results. Since, in designing the questionnaire, it was found impractical to record individual consumption figures, there was no alternative to this procedure.

Even with the procedure described above, the analysis of variance was not entirely satisfactory. The difficulty experienced pertained to the requirement of a normal universe when using F-distribution tables. In all of the meat classifications except "all meats," the presence of a large number of zero variates (households having no consumption of pork, for example, in the week of the survey) would have invalidated the use of F-distribution tables. The only way to circumvent this difficulty is to omit the zero variates. Table A-1 shows the effect of using this method.

Although the figures under (a) in table A-1 appear to be quite different from those under (b), it will be observed that the relative ranks of the various items are much the same. There are minor exceptions, but the most noticeable characteristics of (a) and (b) are the same. Specifically, the Japanese are far below the average as beef eaters; the Chinese are far above average in consumption of both pork and poultry; the Hawaiians and part-Hawaiians are far above the average as fish eaters;

Table A-1.—Weekly per capita consumption of certain meats, by racial background of family, Island of Oahu, Hawaii, October 1952. (See footnote for definitions.)

		CAUCASIAN	CHINESE	HAWAIIAN*	JAPANESE
Beef:	(a)	1.20	1.04	1.18	.64
	(b)	1.10	.93	.97	.59
	(c)	15/176= 9%	11/97=11%	17/98=17%	28/325= 9%
Pork:	(a)	.49	.72	.60	.38
	(b)	.23	.62	.45	.28
	(c)	91/176=52%	13/97=13%	24/98=24%	84/325=26%
Fish:	(a)	.42	.46	.64	.38
	(b)	.10	.26	.39	.28
	(c)	133/176=76%	41/97=42%	39/98=40%	87/325=27%
Poultry:	(a)	.50	.74	.63	.61
	(b)	.24	.39	.20	.26
	(c)	93/176=53%	46/97=47%	67/98=68%	183/325=56%
All meats:†	(a)	3.19	3.04	3.22	2.35
	(b)	3.19	3.04	3.22	2.35
	(c)	0/176= 0%	0/97= 0%	0/98= 0%	0/325= 0%

* Includes part-Hawaiian.
† Includes many kinds of meat, not just the four kinds listed above.

Note: In each section of the above table:
(a) Weekly per capita consumption, in pounds, *ignoring* households with zero consumption in week of survey.
(b) Weekly per capita consumption, in pounds, *including* households with zero consumption in week of survey (table 7 values).
(c) Ratio of number of households with zero consumption to total number of households in each race category.
Consumption is based on retail weight.

and, in the "all meats" category, the Japanese are again far below average. Another noteworthy feature of the table is the comparatively large proportion of Caucasians who consumed no pork and no fish in the week of the survey.

As explained above, an analysis of variance for the figures under (a) in table A-1 is valid but not for those under (b). Accordingly, we have the analysis of variance indicated by table A-2 for the (a) data. It is to be noted that a significant difference at the 5 percent level exists in all categories except poultry.

If statistical tables were in existence permitting an analysis of variance for the (b) data, it is very probable that the analysis would produce a significant difference at the 5 percent level in all categories, including poultry. This conclusion is purely an opinion based on a comparison of the variability under (b) with that under (a).

REGRESSION ANALYSIS

Regression coefficients and t-ratios are shown in tables A-3, A-4, and A-5. The amounts of lamb and mutton consumed were so small that it was impossible to calculate a regression for them.

The absence of a t-ratio in some places in table A-3 is simply due to the consideration that the information provided by the t-ratio in these instances did not justify the additional labor of computing it. The form of the IBM tabulations in these cases made the work of getting a t-ratio very time-consuming.

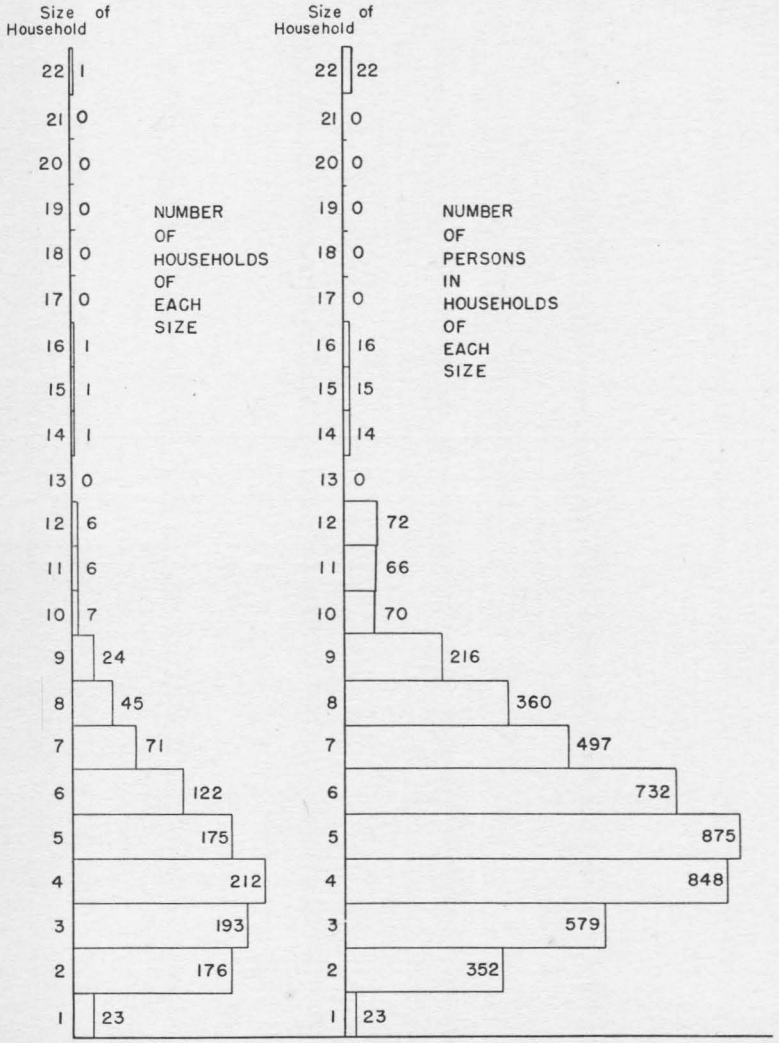

Fig. A-1. Composition of sample with regard to size of households, Honolulu, Hawaii, October 1952

Table A-2.—Analysis of variance for means (weekly per capita consumption) shown under (a) in table A-1.

KIND OF MEAT	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F RATIO
Beef				
Means	42.71	3	14.2367	F =21.91
Within	405.91	621	.6536	F.95= 2.62
Pork				
Means	8.05	3	2.6833	F =10.00
Within	128.78	480	.2682	F.95= 2.62
Fish				
Means	3.16	3	1.0533	F = 4.94
Within	83.69	392	.2135	F.95= 2.63
Poultry				
Means	1.86	3	.6200	F = 2.12
Within	83.63	303	.2925	F.95= 2.63
All meats				
Means	115.74	3	38.5800	F =12.37
Within	2,160.86	692	3.1226	F.95= 2.61

Table A-3.—Regression coefficients and t-ratios, all kinds of meat combined.

DEPENDENT VARIABLE	INDEPENDENT VARIABLE	a	b	t	FAMILY DESCRIPTION
Consumption	Monthly income	7.45	.016	5.3	All families
Value	Monthly income	4.05	.014	6.1	All families
Consumption	Size of family	4.25	1.82	17.7	All families
Per capita consumption	Size of family	4.07	— .246		All families
Value	Monthly income	5.23	.0083	2.6	With one breadwinner
Consumption	Size of family	0.384	1.39		With income less than $200 monthly
Consumption	Size of family	5.26	1.37		With income $200 to $400 monthly
Consumption	Size of family	6.09	1.51		With income $400 to $600 monthly
Consumption	Monthly income	4.66	.0095		With 1 or 2 members
Consumption	Monthly income	7.86	.0072		With 3 or 4 members
Consumption	Monthly income	9.43	.0132		With 5 or 6 members
Value	Monthly income	3.82	.0080		With 1 or 2 members
Value	Monthly income	4.64	.0102		With 3 or 4 members
Value	Monthly income	6.53	.0113		With 5 or 6 members

Note: Monthly income refers to the monthly income of all members of a household combined. *Value* refers to dollars spent on all kinds of meat for all members "in the past 7 days." *Consumption* refers to pounds consumed by all members "in the past 7 days."

The following graph (fig. A-2), which may be of interest to readers of the Appendix, presents in a different form much the same information as that shown in figure 8 of the main part of the bulletin. One of the advantages of this graph is that it permits observation of the effect of changing income on meat purchases without appreciable change in size of family. This is of interest, since increasing income often brings with it an increase in family size to exaggerate the influence of income.

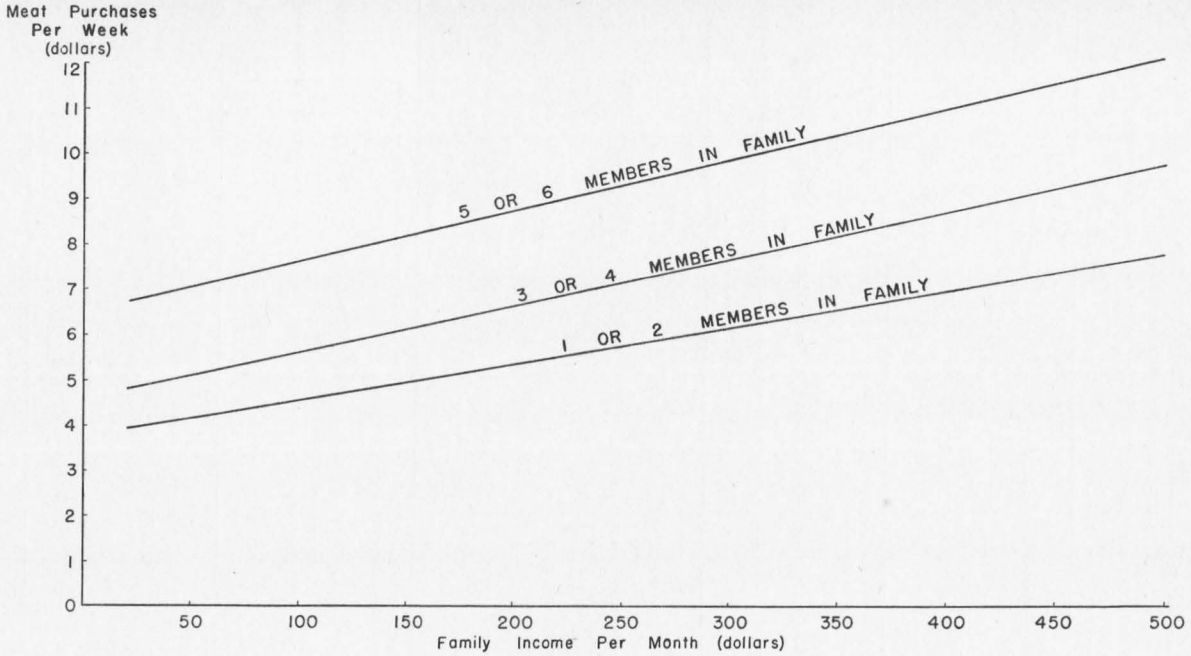

Fig. A-2. Effect of family income upon meat purchases per week, Honolulu, Hawaii, October 1952

It is apparent from these regressions that the rate of change of expenditures associated with variations in income is great, and that it is greater for the large family than for the small. However, closer analysis also reveals that the ratio of expenditures to income decreases as income increases along all three regression lines.

Table A-4.—Regression coefficients and t-ratios, consumption of various kinds of meat versus monthly income.

DEPENDENT VARIABLE*	a	b	t
Beef	1.39	.0063	4.79
Pork	1.12	.0023	2.44
Veal	− .021	.0004	2.08
Ham	− .276	.0031	4.54
Poultry	.832	.0024	3.05
Fish	1.65	.0002	0.67†
Sausage	.50	.0005	1.45†
Canned meat	1.26	−.0002	−0.26†

* The independent variable is the monthly income of the combined members of the household.
† Not significant at the 5 percent level.

Table A-5.—Regression coefficients and t-ratios, consumption of various cuts of meat versus monthly income.

DEPENDENT VARIABLE*	a	b	t
Beef steaks	.137	.0019	2.97
Other steaks	.275	.0018	2.91
Hamburger	.177	.0013	3.37
Pork loins	.370	.0030	3.82
Spareribs	.398	−.0004	−1.24†
Veal	− .021	.0004	2.08
Bacon	.304	.0010	2.42
Canned meat	.960	−.0002	−0.30†
Chicken	.660	.0025	2.96
Hawaiian fish	1.616	−.0003	−0.39†
Mainland fish	.014	.0003	1.59†
Canned fish	.307	−.00002	−0.06†
Shellfish	− .036	.0007	2.49

* The independent variable is the monthly income of the combined members of a household.
† Not significant at the 5 percent level.

Table A-6.—Reasons for preference of mainland beef by 138 Honolulu families, by racial background of family, October 1952.

RACIAL BACKGROUND	PRICE	LESS FAT	CHOICE OF CUTS	COLOR	TASTIER	DON'T KNOW	OTHER	TOTAL
Japanese	5	1	2	—	3	7	19	37
Chinese	2	—	—	1	—	1	6	10
Caucasian	17	—	3	1	22	6	19	68
Filipino	1	—	—	—	—	—	—	1
Portuguese	1	—	—	—	1	—	2	4
Hawaiian*	3	1	1	—	2	2	2	11
Mixture	1	—	—	—	1	—	—	2
Other	3	—	—	—	1	1	—	5
Total	33	2	6	2	30	17	48	138

* Includes part-Hawaiian.

Table A-7.—Reasons for preference of island beef by 614 Honolulu families, by racial background of family, October 1952.

RACIAL GROUND	PRICE	FRESH	MORE FAT	CHOICE OF CUTS	LOCAL PROD-UCT	COLOR	TASTIER	DON'T KNOW	OTHER	TOTAL
Japanese . . .	2	120	—	—	3	7	69	41	34	276
Chinese	2	39	—	—	2	—	29	4	6	82
Caucasian . .	4	30	—	1	2	1	19	1	4	62
Filipino	—	9	—	—	—	—	5	2	—	16
Portuguese	1	24	—	—	—	1	15	2	3	46
Hawaiian*. .	5	40	1	—	1	—	29	3	4	83
Mixture. . . .	1	14	—	—	—	1	6	1	—	23
Other.	—	16	—	—	1	—	6	2	1	26
Total. . . .	15	292	1	1	9	10	178	56	52	614

* Includes part-Hawaiian.

Table A-8.—Reasons for preference of mainland pork by 230 Honolulu families, by racial background of family, October 1952.

RACIAL BACKGROUND	PRICE	FRESH	LESS FAT	LEAN PORK	COLOR	TASTIER	DON'T KNOW	OTHER	TOTAL
Japanese.	12	—	13	6	—	4	2	16	53
Chinese.	3	1	—	—	—	—	1	3	8
Caucasian.	26	1	12	2	2	14	10	35	102
Filipino.	2	—	—	1	—	—	—	—	3
Portuguese.	4	—	9	—	—	4	2	8	27
Hawaiian*.	5	1	4	2	—	3	—	5	20
Mixture.	3	—	2	—	—	1	—	2	8
Other.	3	—	—	—	1	2	1	2	9
Total.	58	3	40	11	3	28	16	71	230

* Includes part-Hawaiian.

Table A-9.—Reasons for preference of island pork by 501 Honolulu families, by racial background of family, October 1952.

RACIAL BACK-GROUND	PRICE	FRESH	MORE FAT	SOFT PORK	LOCAL PROD-UCT	COLOR	TASTIER	DON'T KNOW	OTHER	TOTAL
Japanese . . .	—	111	3	3	3	3	48	40	21	232
Chinese	—	45	1	—	2	—	28	9	6	91
Caucasian . .	1	19	2	1	—	—	7	5	2	37
Filipino	—	2	1	—	—	—	7	1	1	12
Portuguese	—	10	2	—	—	2	7	1	3	25
Hawaiian*. .	3	29	4	—	4	—	22	4	2	68
Mixture. . . .	—	6	—	1	—	—	3	—	1	11
Other.	—	10	—	—	1	—	10	4	—	25
Total. . . .	4	232	13	5	10	5	132	64	36	501†

* Includes part-Hawaiian.
† One schedule omitted from tabulation.

Table A-10.—Reasons for preference of mainland poultry by 187 Honolulu families, by racial background of family, October 1952.

RACIAL BACKGROUND	PRICE	FRESH	TASTIER	DON'T KNOW	OTHER	TOTAL
Japanese	19	—	2	2	18	41
Chinese	1	—	—	1	5	7
Caucasian	31	1	7	7	44	90
Filipino	—	—	—	—	1	1
Portuguese	6	—	—	1	5	12
Hawaiian*	8	—	1	1	6	16
Mixture	4	—	1	2	5	12
Other	5	—	1	—	2	8
Total	74	1	12	14	86	187

* Includes part-Hawaiian.

Table A-11.—Reasons for preference of island poultry by 581 Honolulu families, by racial background of family, October 1952.

RACIAL BACKGROUND	PRICE	FRESH	LOCAL PRODUCT	COLOR	TASTIER	DON'T KNOW	OTHER	TOTAL
Japanese	4	142	4	—	62	23	39	274
Chinese	2	45	2	—	24	2	9	84
Caucasian	2	32	—	—	8	4	2	48
Filipino	—	8	—	—	4	—	2	14
Portuguese	2	21	1	—	7	2	5	38
Hawaiian*	2	37	4	1	24	1	12	81
Mixture	2	9	—	—	4	—	—	15
Other	—	14	1	—	7	1	4	27
Total	14	308	12	1	140	33	73	581†

* Includes part-Hawaiian.
† One schedule omitted from tabulation.

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